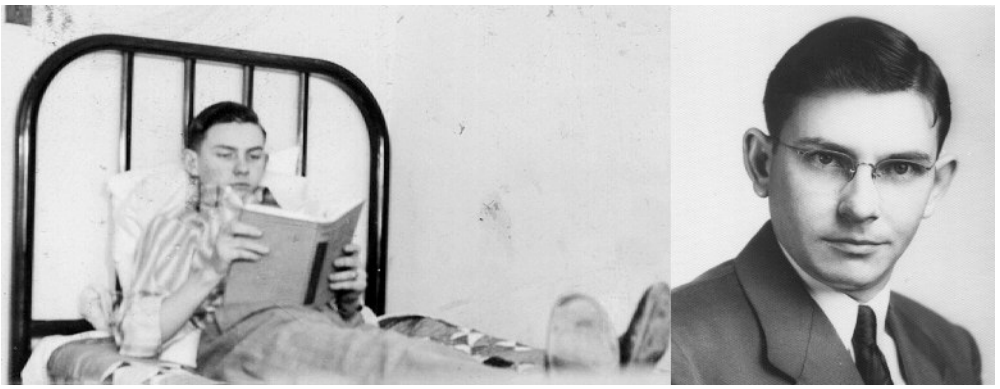
Spectroscopist Profile:
Theodore C. Rains

It is with a great deal of pleasure that I introduce this issue's profile of an Honorary Member of the Society for Applied Spectroscopist: **Ted Rains**. Ted hired me at the National Bureau of Standards over a quarter of a century ago, and we worked together for almost 20 years. My first publications were co-authored with Ted, I taught a number of courses with him, and I gained most of my knowledge of the "art of sample preparation" by working with him for so many years. But there is much more to the story of Ted's career than most of us realize. It is a story filled with perseverance and hard work and the measure of the man is that 7 years after his "retirement" he is busier and more successful than ever. So here's the rest of the story.

Ted was born on a Kentucky tobacco and dairy farm in 1925. Those of you who have experienced dairy farming know about the long hours and hard work, so you can imagine how hard Ted and his three brothers worked to keep the family afloat during the difficult depression times. Ted graduated in 1942 from Pleasureville High School (3rd in a graduating class of 47) with dreams of a medical career. The next year he attended Morehead State University, paying his expenses by doing janitorial work. However, at the end of the year he had to return to the farm to help his parents keep it going. The next 4 years were spent working on the farm, and it was there that he met his wife Mavis, who was teaching at a nearby school. They have now been married for over 50 years.



Ted studying in his room in Allie Young Hall of Morehead State University

In 1948 Ted again returned to school, this time at Eastern Kentucky State University, with the intent to major in pre-med. However, he later changed to chemistry and graduated with a B.S. in 1950.

Jobs were difficult to come by, and both Ted and Mavis taught at Breathitt County High School. Ted taught chemistry, physics and biology, while Mavis taught typing and business courses. Ted remembers those days fondly, despite the $1800 yearly salary, which forced him to work at a local service station to supplement his income. He formed a science club and remembers organizing a number of activities for the students.

In the spring of 1951, Ted's brother told him of a job opening at Kentucky Synthetic Rubber, where he worked (often the late shift) until 1952, when he found an opportunity in the high-radiation laboratory at Oak Ridge, determining U, Pu, and fission products. Some of the material he worked with was so hot that workers were only allowed 30 seconds in the room with it. As Ted described it, "You worked until your badge turned black." After two years in the "hot cell", he started working in neutron activation analysis, and it was there that he learned wet chemistry. He later was a group leader in the reactor research program and directed a research group in the development of methods for analysis using atomic absorption and emission spectroscopy.

Ted's first daughter Connie was born while he was working at Kentucky Synthetic Rubber, followed later by Diane and Pam during the 13 years he spent at Oak Ridge. Once the children were old enough, the family would pile into their vehicle every summer for a 3 week vacation traveling around the country … something that Ted always looked forward to with great delight.

It was at Oak Ridge that Ted met four scientists that changed his life. John Dean taught courses at the laboratory, and Ted's supervisor allowed him to attend the courses. He also took graduate courses at the University of Tennessee and published a number of papers with John. That friendship and collaboration has continued, with a number of books co-authored, including the popular 3-volume series "Flame Emission and Atomic Absorption Spectrometry." At the recent FACSS meeting, Ted accepted the Honorary Membership Award of SAS for John in absentia.

Ted (left) and coworkers at the Kentucky Synthetic Rubber Company, developing methods for the production of cold rubber.

Using an early model atomic absorption spectrometer at NBS.

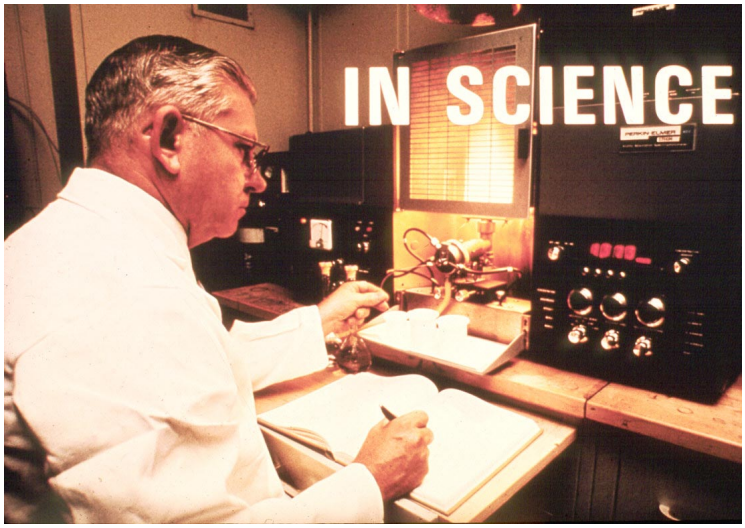
Hobart Willard visited Oak Ridge and it was from him that Ted learned perchloric acid digestions and that sparked his interest in sample preparation methods. Ted remembers Willard's demonstration of the perchloric acid dissolution of a organic sample, and how the careful addition of nitric acid to the solution at the right moment could prevent an explosion.

Roy Koirtyohann also worked at Oak Ridge during that period, and formed a friendship with Ted that resulted in their co-teaching courses in atomic absorption spectrometry for a number of years.

And finally, Ted's supervisor at Oak Ridge, Oscar Menis, co-authored many papers with Ted and was directly responsible for bringing him to NBS in 1965. At NBS, Oscar remained his supervisor, collaborator and friend until his death in the late 1970s.

Despite his lack of a Ph.D., Ted was hired at NBS into a Ph.D. slot in recognition of his scientific accomplishments. Ted's activities over the next 25 years at NBS (later NIST) proved that decision to be a wise one. In the late 1960s, he and W. Snelleman developed the first successful wavelength modulation background correction system for emission spectrometry, which is still in use today. In the early 1970s, he and coworkers developed the first background correction system for atomic fluorescence spectrometry that was applied successfully to the analysis of Standard Reference Materials (SRMs). He developed innovative methods for the determination of mercury, arsenic and selenium; was instrumental in designing methods for Pb blood analysis; and did pioneering work for real sample analysis using graphite furnace AAS.

It is perhaps for his contributions to the development of the SRM program at NBS that Ted is best known. While his activities included the development of methods to determine inorganic constituents in over 450 SRMs, his most important contribution was conceiving and developing the NBS/NIST Spectrometric Solution Standards program, which he ran for a number of years until his retirement. This was the most successful SRM in the history of the program.



An NBS publicity shot showing Ted using a "modern" flame atomic absorption spectrometer for metals analysis.

Ted was also an international ambassador for NBS, traveling to many countries to give lectures and courses. His activities brought guest workers from countries such as Scotland, Holland, Brazil, China, Mexico, Taiwan, India, England, Egypt, Vietnam, Japan, and Korea to NBS. Not only did these activities contribute to improving chemical metrology around the world, but through these interactions, we (in Ted's group) had the opportunity to make many new friends.

Ted has served as president of the National SAS organization and was awarded Honorary Membership in SAS. He served on the editorial advisory boards of a number of journals, and was a co-chairman of the FACSS meeting. He is also an official "Kentucky Colonel", an honor bestowed upon him by the governor of Kentucky for his scientific accomplishments.

But perhaps his greatest accomplishment has been what he has done after his retirement from NIST in 1990. Starting from scratch, he founded High Purity Standards of Charleston, SC, and has turned it into a highly regarded and successful business.

When I interviewed Ted in his office and lab in Charleston, I found he hadn't changed a bit. He is greatly respected by his employees

Ted and Mavis on their 50th wedding anniversary.

… one actually gave him a hug as he left on a trip. Now when is the last time you felt your boss deserved a hug? He still loves gardening and growing roses, and his number one priority in life is still his family.

At the culmination of a long and prolific career, Ted just keeps on going and going. It is an enviable record for a remarkable man.

Ted today in his office at High Purity Standards.